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Crack Cocaine as a Major Risk for HIV Transmission in a Crack House Population

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Crack Cocaine as a Major Risk for HIV Transmission in a Crack House Population

To investigate the prevalence of ulcerative sexually transmissible diseases (STD) and hepatitis in crack users, we interviewed 435 crack users on-site in crack houses in Houston, Texas and took blood for laboratory analysis. There was evidence of infections of syphilis in 13%, herpes simplex virus-2 (HSV-2) in 61%, HIV in 12%, hepatitis B in 52%, and hepatitis C in 41% of cases. On DSM-III-R criteria, 12% were crack abusers and 84% crack dependent: over half reported previous treatment. Forty percent reported also injecting. Sexual behavior indicated a mean of 2.4 partners in the past month for men, 3.7 for women. Sexual behavior was largely vaginal, although women also reported more than twice the level of oral sex than men. Significant multivariate predictors for HIV and hepatitis B and C were previously reported STD and injecting drug use (including sharing needles), while female gender for syphilis and HSV-2, and condom use for HSV-2, were significant risks. These data confirm high rates of STDs in a crack house population as inferred from previous clinic-based and community studies of the link between STDs, injecting and HIV. The high rates of STDs found should lead to considering STDs and substance abuse to be dual diagnoses in crack users, with the integration of STD diagnosis and treatment into crack outreach and substance abuse treatment programs.

Background

Crack cocaine use now appears to be one of the major risk factors associated with HIV transmission in the United States. The association of crack (smokeable freebase cocaine) use with increased sexual activity due to heightened sexual arousal (Gawin and Ellinwood, 1988), as well as the addictive nature of the drug and the exchange of sex for money or drugs, lead to both a direct risk of HIV transmission through sexual contact as well as a heightened risk of HIV transmission due to the cofactor of genital ulcer disease caused by such sexually transmissible diseases (STDs) as syphilis, herpes, and chancroid. These associations are now sufficiently robust that the need to treat crack addictions can

be seen as a direct way of reducing the incidence of HIV infection.

Crack and Sex

The association of crack and sex has been extensively documented (Minkoff et al., 1990; DeHovitz et al., 1994; Falck et al., 1997). Williams (1992), in an ethnographic study of a crack house in New York city, notes that the exchange of sex for drugs in women is common. However, his research shows that “Most women act on the basis of individual choice, depending on their own desires and the opportunities that emerge in any given situation” (p. 112). Williams notes that men come to crack houses for sex, bringing drugs as the medium of exchange, but that for some of the people in the crack house,

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“Cleghorn et. al conclude that HIV is primarily heterosexually transmitted in a milieu of unprotected sexual activity fueled by crack cocaine.”

“... sex is as much of a drug as the freebase they inhale... The men say the drug stimulates the female; the women say the drug excites the male. It is clear from the frequency of sexual encounters that there is some truth to both assessments” (p. 115). He suggests that while oral sex is preferred, being less complicated and more manageable given the need to perform in any accessible place, it is difficult to use condoms given the power of the man in the situation, and the fact that there is little caution displayed once intoxicated (a finding echoed by Falck et al., 1997). Williams observed that the practice of safe sex was rare in the crack houses he studied.

In a study in Trinidad (Cleghorn et al., 1995), risks for HIV prevalence in STD clinic attenders indicated that (where HIV seroprevalence increased from 3% in 1987-8 to 14% in 1990-1), the highest odds ratio (OR) for males was crack use in the past six months (OR=6.2), followed by genital ulcer disease (OR=5.2), genital warts (OR=3.9), and syphilis (OR=3.2), supporting the importance of crack use

as a primary predictor. For women, the predictors were commercial sex work (OR=5.7), early initiation of sexual activity (OR=4.8), and past nongonococcal cervicitis (OR=4.1). Cleghorn et al. conclude that HIV is primarily heterosexually transmitted in a milieu of unprotected sexual activity fuelled by crack cocaine—and that targeted interventions must include treatment for crack addiction as part of disrupting the STD (including HIV) and crack synergism. In the United States, similar findings have been reported. Diaz et al. (1994), in a multi-state (eleven sites) surveillance project of heterosexual people with HIV infection, reported that non-injection drug use was the most common risk factor, and crack the most common drug used, along with alcohol. Multiple sex partners among the men, but not among the women, were also predictors, suggesting that the one of the most significant risks for women is not their own behavior but that of their sexual partners. Nevertheless, a similar pattern of noninjection drug use (again, with

What is an odds ratio (OR)?

Odds ratio refers to the ratio of one odds to another and measures how strong the association is between a characteristic and a disease. An odds ratio of “1” means there is no association, whereas an odds ratio of “2” means that odds in favor of the disease are twice as high.

crack the most common) emerged for the women as well. DeHovitz et al. (1994), studying women recruited from ambulatory and community health clinics, drug treatment centers, and directly from the community (and excluding injecting drug users), reported that at least 26% of crack users reported trading sex for drugs. They report that recent crack use was the strongest predictor of laboratory-confirmed syphilis infection (5.2% of cases, OR=12.8), and that crack use was highly correlated with frequency of sex partners. An STD (gonorrhea, chlamydia, syphilis, trichomonas) was present in 35% of their study subjects.

STDs and Crack Users

Ernst and Martin (1993), looking at the other side of the equation in a study of cocaine users (of whom two-thirds used crack), found that 58% of women and 19% of men had latent or previously treated syphilis. In 1990, Minkoff et al. reported that in pregnant women giving birth in a New York inner city hospital, the prevalence of syphilis (as measured by RPR) was 18.7% among those with positive urines for cocaine, and 2.4% in those with negative urines (OR=9.3). In a study of HIV-infected pregnant women, Ellerbrock et al. (1992) also found that use of crack was independently associated with HIV infection (OR=3.3), along with African American ethnicity (OR=11.0), having inter-

course with a high-risk partner (OR=5.6), and testing positive for syphilis (OR=3.1). Ellerbrock et al., in common with other researchers, identified a constellation of crack use, multiple sexual partners, African American ethnicity, and other STDs as being associated independently with HIV infection. Schwarcz et al. (1992), in a study of African American adolescents in San Francisco, reported that exchange of sex for money or drugs and crack use were the best predictors of gonorrhea in young women.

The same constellation of crack use, genital ulcer disease, and HIV infection was identified by Chirgwin et al. (1991) in urban minority heterosexuals in New York. Again, the highest independent odds ratios associated with HIV infection were crack use (OR=3.0), followed by genital ulcer disease (OR=2.7), and concurrent STDs (OR=2.5). They interpret these findings as being related to high risk sexual behavior with multiple partners, which in turn is partially attributable to crack use and the associated exchange of sex for money or drugs. They also note the high rate of co-infection with HIV, and STDs which cause genital ulcer disease, which suggests that there is increasing efficiency of sexual transmission of HIV via the ulcerative lesions. This is entirely consistent with the African evidence, which has demonstrated that genital ulcer disease signifi-

“One study suggests that one of the most significant risks of HIV infection for women is not their own behavior but that of their sexual partner.”

“Some studies demonstrate that genital ulcer disease significantly increases the chance of HIV transmission.”

“Studies of STDs in injecting drug users have shown increasing levels of STDs, but not to the same degree as in crack users.”

cantly increases the chance of HIV transmission (Piot and Laga, 1989). A further study from New York (Chaisson et al., 1991) confirmed the association of crack, HIV transmission, and exchange of sex for money or drugs. Behaviors significantly associated with HIV infection in women were crack use and prostitution, and in men a history of syphilis and crack use.

Sex and STDs Linked to Crack

Reviewing the links between crack, sex, and STDs (including HIV), Marx et al. (1991) conclude that increasing rates of STDs and HIV appear to be related to crack use. Summarizing sixteen studies, they concluded that eight studies found an association between crack and STDs, seven found STDs to be related to drugs and particular methods of cocaine use, and only one found no significant association. The exchange of sex for money or drugs was also associated with STDs in seven studies. Despite some methodological weaknesses, they note the overwhelming weight of the evidence points to the “unique risk conferred by crack.” From the empirical evidence, it is apparent that the chain of relationships begins with crack use, which leads to high risk sexual behavior (frequently with multiple partners or in exchange for money or drugs as the crack addiction becomes established). This high risk behavior may lead directly to HIV infection, or less directly as genital ulcer disease

caused by STDs such as syphilis, chancroid or herpes facilitates HIV transmission through mucosal lesions. It is readily apparent that treatment of crack addiction is a necessary condition for a major reduction in the incidence of HIV infection where crack use is endemic, given its position at the head of a causal chain leading to HIV transmission.

Injecting Drug Users and STDs

Studies of STDs in injecting drug users (IDUs) have shown increased levels of STDs, but not to the same degree as in crack users. Ross et al. (1991) found in a study of over two thousand IDUs in Sydney, Australia that STDs (which function as a surrogate of HIV sexual transmission risk) were common in the sample, with over one third of men and over half the women reporting at least one STD in their lifetime (mean age of the sample was 28). The lowest lifetime prevalence was in heterosexual individuals, the highest in homosexual men, with bisexuals reporting intermediate rates. Because of the question about how the STDs were diagnosed, a further study by Ross, Wodak and Gold (1993) determined that almost without exception, STDs reported were diagnosed by a physician rather than being self-diagnosed: this second study also indicated a high and stable rate of STDs in IDUs (over half of the men and two-thirds of the women

reported at least one lifetime STD in this study). These data confirm that while there is a high prevalence of reported STDs in IDUs, they do not reach the level of risk posed by crack.

Discrepancies in Reporting STDs

A study in the United States by Kleyn, Schwebke and Holmes (1993) looked at the possible discrepancies between reported and prevalent STDs, since there is a significant proportion of STDs in which infection is subclinical, particularly in women. They found that there was under-reporting of STDs when self-report was compared with biological assays for STD infection, with half of those not reporting hepatitis B having markers of infection, 3.5% of those who did not report syphilis having evidence of infection (and none of those five individuals reporting syphilis having markers of infection), and half of those who reported never having herpes having serological evidence of HSV-2 infection. Kleyn, Schwebke and Holmes' data demonstrate the importance of having serological measures, as well as some of the self-report inaccuracies in terms of false-positives with regard to their data on syphilis. For this reason, we sought to estimate the rates of sexually transmissible infections in a population actually attending a crack house, to avoid the bias of sampling crack users indirectly.

Problem

We carried out a blind point-prevalence study of biological markers to STDs and of recent sexual and drug use behaviors in a crack-using population (people who had used crack in the last four weeks) recruited at crack houses in Houston, Texas. As far as we are aware, this is the first study to collect questionnaire and biological data on STDs at the site of the crack house.

These were the purposes of the study:

- 1) Estimate prevalence of infection with syphilis, herpes simplex virus-2, hepatitis B and C, and HIV in this population;
- 2) Determine the drug use behaviors associated with these STDs including route of administration;
- 3) Determine the sexual behaviors in this population; and
- 4) Determine the level of abuse/dependency and drug treatment history.

STD treatment for crack cocaine users may be needed to reduce the direct (through sexual behavior) and facilitated (through genital ulcer disease) spread of HIV, as well as providing the possibility for recruitment and treatment for drug abuse through STD treatment centers. STD treatment, like needle and syringe exchanges and provision of injecting equipment decontaminants, may be one of the

“This study is designed to determine whether a new model which combines STD and drug treatment services for crack users may be appropriate to reduce the spread of HIV infection.”

“All the crack houses surveyed were in the inner city and surrounding suburbs of Houston.”

“Blood samples were analyzed for HIV, syphilis, hepatitis B and C, and herpes.”

only methods of reaching a population with a unique mix of drug and associated sexual behaviors. Treatment cannot proceed, however, without a better understanding of the drug, sexual, and infectious disease characteristics of this population in urban Houston, and of the avenues for both direct and indirect intervention to reduce HIV spread. This study is designed to provide these data to determine whether a new model which combines STD and drug treatment services for crack users may be appropriate to reduce the spread of HIV in this population.

Method

Four hundred thirty-five people who had used crack cocaine in the past four weeks were interviewed at or adjacent to crack houses in the Houston metropolitan area. Respondents were paid \$15 to complete a brief (22 question) questionnaire and following this to give 10 mls of peripheral venous blood for laboratory analysis. The study was approved by the relevant university committee for the protection of human subjects and the purpose and nature explained to respondents prior to administering the questionnaire. Sites were selected by the outreach worker stationed in one of the areas where a significant number of crack houses were located, and who had worked as an HIV/STD street outreach worker and phlebotomist in the area for the past eight years. All questionnaires were

administered and blood samples drawn by the outreach worker and an assistant who worked with him to avoid duplication of respondents. All respondents at each site were invited to participate to avoid sampling bias. The period of the study covered six weeks from March to April 1997.

All of the crack houses surveyed were in the inner loop (inner city and surrounding suburbs) area of Houston (metropolitan area population 4.3 million). Some were occupied single-family homes, while others were abandoned structures with no gas, electricity, or running water. Informants, who were crack users, aided the outreach worker in locating many of the houses. No crack was sold at the houses: rather, users brought crack with them to smoke or left to buy crack and returned to smoke it. The population using the crack houses was highly transient and ranged from as few as five to as many as 20 at any given time.

Determination of level of drug abuse or dependency was determined by using five of the DSM-III-R questions in the questionnaire (listed in the Results section). Respondents with one or two positive responses are considered to be abusers; three or more positive responses indicated dependence.

Blood samples were analyzed in The University of Texas School of Public Health's Infectious Diseases Laboratory, with the exception of the HSV-2 testing, which was carried out by a commercial laboratory (see Appendix 5). The prevalence of STDs (HIV, syphilis, HBV, HCV and HSV-2) were determined by laboratory testing for presence of antibodies. HIV-1 antibody (anti-HIV) was performed by HIV-1EIA (Abbott Laboratories, Chicago, IL). Repeated reactive specimens were confirmed by HIV-1 Western Blot testing (Cambridge Biotech). Screening for syphilis antibody was performed by nontreponemal testing with the RPR test (Becton Dickinson). Reactives were confirmed by a treponemal test, the MHA-TP (Ames). Hepatitis C antibody (anti-HCV) was tested by HCV EIA-2 (Abbott Laboratories, Chicago, IL). Hepatitis B core antibody (anti-HBc), a marker for carrier, and hepatitis B surface antigen (HBsAg) were tested by HBV EIA (Abbott Laboratories, Chicago, IL). Herpes simplex type 2 was tested by private laboratories (Labcorp, Raritan, NJ) using the newly available Cobs Core HSV-2 IgG EIA which employs highly specific gG-2 antigen directed at HSV-2 antibody (anti-HSV-2).

The data from interview questionnaire and laboratory testing were entered into EpiInfo and analyzed using Minitab and PC SPSS 7.0 software.

The prevalence of STDs in this population were calculated using cross-tabulations and chi-square tests of independence. Univariate analysis was first done to determine the association between infections and demographic and drug use information and sexual behavior. Multivariate logistic regression analysis was then performed to determine independent association of variables. The odds ratios (OR) and 95% confidence interval (CI) were estimated for each variable. Chi-square analyses and *t*-tests for continuous data were carried out where appropriate by gender on the questionnaire data. Due to missing data, not all *n*'s total 435. Means \pm standard deviations are reported.

Results

Data on the sample are presented in Appendix 1. Data on the markers for the STDs and related infectious diseases are presented in Appendix 2 and 3. Data on the distribution of condom use appear in Appendix 4.

Demographics by Gender

The sample consisted of 348 (81.5%) men and 79 (18.5%) women (8 responses missing). Of the men, 254 (73%) reported themselves as being married, as did 44 (55.7%) women. For the men, only 27 (7.8%) were employed full-time, and a further 20.1% part-time (comparable figures for women were 3.8% employed full-time and 16.5% part-time). The remainder

“The study sample consisted of 348 men and 79 women recruited at or near crack houses in Houston.”

“The number of children reported was significantly different between men and women.”

reported being unemployed. Median age was 40 (range 21 to 67, 25th centile 35, 75th centile 45). Race/ethnicity was (men) 310 African American (89.1%), 2 (.05%) Hispanic, 22 (6.3%) European American, one Asian/Pacific Islander, and two (.05%) other. For women, the figures were 74 African American (93.7%), and the remainder European American (ns difference between genders). Number of children (their own, not stepchildren) reported was significantly different between men and women (men, mean 1.6±1.7, women, mean 2.5±1.8, $t=-4.3$, $p<.001$).

STD Prevalence

Data for sexually transmissible diseases were HIV seropositive 11.3%; syphilis, RPR (screening test) 14.9%, MHA-TP (confirmatory test) 13.3%; herpes simplex virus-2, 61.1%; hepatitis B, anti-HBc (previous infection) 52.4%, HBsAg (carrier) 5.3%; and hepatitis C (anti-HCV) 41.6%. Odds ratios for the predictor demographic, drug and sexual characteristics are presented in Appendix 3.

Drug Use

Of the sample, 136 (39.1%) of men and 32 (40.5%) of women reported having injected drugs ever (ns), and for men of these 72 (52.9%) and for women of these 15 (46.9%) indicated that they had shared needles and works (ns). In response to the question as to how many times they had used

crack in the past four weeks, there were significant differences between men (mean 26.9±70.2) and women (mean 64.1±235.9) ($t=-2.5$, $p<.02$). Reported age at first crack use was not statistically significant: for men, mean 29.0±9.2, for women mean 27.8±9.1. Of the sample, 72 (16.6%) indicated that they had previously used heroin, with first age of use being a median of 24, range 11 to 49.

In terms of DSM-III-R questions on degree of crack abuse, in response to the question “Have you ever used a much larger amount of crack than you intended to, or for a longer period than you intended to?”, 292 (83.9%) men and 60 (76%) women answered in the affirmative (ns). In response to the question “Has there been any period when you spent a great deal of your time using crack, getting it, or getting over its effects?”, 286 (82.2%) men and 60 (76%) women answered in the affirmative (ns). When asked “Did you ever have any emotional or physical problems from using crack such as feeling uninterested in things, depressed, suspicious of people, paranoid, or having strange ideas, 295 (84.8%) men and 65 (82.3%) women confirmed such symptoms (ns). When asked “Did you ever find you needed larger amounts of crack just to get the same effect, or that the same amount had less effect than before?”, 286 men (82.2%) men and 50 (63.3%) women indicated that this was the case

($X^2=14.1$, $df=2$, $p<.001$). Finally, when asked “Has stopping or cutting down on crack made you sick or given you withdrawal symptoms?”, 218 (62.6%) men and 55 (69.6%) women (ns) indicated that they had experienced such symptoms. Only 16 (3.5%) respondents reported none of these problems; 12.2% reported one or two of these problems and by DSM-III-R definitions are abusers; and the remaining 84.3% confirmed three or more of these problems, and are thus classified as crack-dependent on DSM-III-R criteria.

Previous Drug Treatment

Previous drug treatment history was confirmed by 195 (56%) men and 49 (62%) women (ns). Comparing those who had previously had drug treatment and those who had not, there were significant differences between the groups on the number of DSM-III-R questions measuring level of abuse/dependency (treatment 4.1 ± 1.3 , no treatment 3.7 ± 1.4 , $t=3.4$, $p<.001$), on the numbers of partners with whom oral sex was performed in the past four weeks (treatment 1.63 ± 4.8 , no treatment 0.9 ± 2.1 , $t=2.2$, $p<.03$), on the number of times crack had been used in the past four weeks (treatment 46.9 ± 155.9 , no treatment 16.7 ± 16.7 , $t=3.0$, $p<.003$), on the number who reported a previous STD (treatment 55%, no treatment 40%, $X^2=9.4$, $p<.002$), the number who had injected

drugs (treatment 45.9%, no treatment 30.8%, $X^2=10.1$, $p<.002$), the proportion of these who had shared injection equipment (treatment 24.8%, no treatment 15.1%, $X^2=6.0$, $p<.02$), and number married (treatment 32.9%, no treatment 24.9%, $X^2=3.8$, $p<.05$). There were no significant differences between the treatment and no treatment group on gender or race/ethnicity.

Sexual Behavior

Sexual behavior reported covered only the past four weeks. The mean number of sexual partners reported by men was 2.4 ± 3.9 different partners, the figures for women being 3.7 ± 8.5 different partners ($t=-2.13$, $p<.04$). Breakdown of these data indicated the number of these partners that vaginal sex was engaged in with was a mean of 2.1 ± 3.1 partners for men, 3.3 ± 7.4 for women ($t=-2.1$, $p<.04$). Oral sex data indicated a mean number of 1.1 ± 2.3 partners in the past four weeks for men, and 2.4 ± 7.7 partners for women ($t=-2.7$, $p<.007$). Reported incidents of anal sex were low: $.02\pm.46$ for men and $.10\pm.71$ for women (ns). When asked to estimate the proportion of these sex acts which had involved condom use, the figures for men and women were not significantly different (see Appendix 4). Known previous sexually transmissible diseases were reported in 168 (48.3%) in men and 38 (48.1%) in women (ns) (some reported multiple STDs).

“By DSM-III-R definitions, 12.2% of respondents are crack abusers, while 84.3% are crack-dependent.”

“The rates of markers for STDs are disturbing, and confirm that prevalence is high in this population.”

Discussion

These data must be interpreted with the caution that this is a nonrandom sample and may not be generalizable beyond Houston. The sample was collected between 10 a.m. and 10 p.m. (with emphasis on daylight hours), and thus the number of employed people in the sample may be under-represented. Further, the fact that the outreach worker who collected the data was African American may have lead to a bias toward African American locations and crack houses, and the race/ethnicity breakdowns reported in this sample may be an artifact of this (although the data demographics are similar to those of Falck et al., 1997 in Dayton and Columbus, Ohio). Williams (1992) noted in his crack house study in New York that his informants included Euro-American, African American and Latinos, and that this mix was a function of the neighborhood in which the research was carried out. In addition, respondents had to have smoked crack at least once in the past four weeks for inclusion in the sample, and thus it may be biased toward more regular users. Thus, the proportions of responses in these data should not necessarily be taken to be representative of crack users in Houston. However, these data were collected to primarily examine the prevalence of markers for sexually transmissible diseases and associated behaviors in a crack-using population, and the discussion will focus on this.

A further limitation is that the sexual behaviors were investigated for the previous month, and this may not reflect consistency with a much longer previous time period. As a consequence, the relationship of sexual behavior with STDs may be underestimated. The data on numbers of sexual partners and sexual acts in the past four weeks is substantially lower than that reported by Falck et al. (1997), and those who consistently reported using condoms nearly double that reported in their study. However, sampling differences (Falck et al. recruited people in drug-copping areas and prostitution strolls, which may have lead to sexual activity being inflated by inclusion of a higher proportion of sex industry workers in their sample) as well as geographic differences may account for this disparity.

The rates of markers for STDs are disturbing, and confirm that prevalence is high in this population. One in 7 had evidence of syphilis infection (significantly lower than the level found by Ernst and Martin (1993) in an emergency room population and significantly higher than the 5.2% reported by DeHovitz et al., 1994), and one in 8 had evidence of HIV infection (again significantly higher than the 2.4% reported by DeHovitz et al., 1994). The markers

for herpes simplex virus-2 were 61% (although a minority of those with evidence of infection are likely to have lesions or other signs of infection). Half of both men and women indicated that they had a symptomatic STD at some time in the past, further confirming a link between crack use in this context and STDs. The highest ORs for syphilis and HSV-2 are reporting having had an STD, marital status, and drug injecting, while for both hepatitis and HIV, the highest ORs were previous STD, employment status for hepatitis B, but injecting drug use and needle sharing for hepatitis C and HIV. In this population, hepatitis B appears to resemble an STD, while the hepatitis C and HIV patterns resemble those of a blood-transmitted pathogen.

Most disturbing, however, were the rates of viral hepatitis: over half the respondents had evidence of hepatitis B infection, and just under half (over 40%) had evidence of hepatitis C infection. These data suggest that not only are STDs and HIV reasonably common in this population, but that viral hepatitis is a previously unanticipated concomitant of crack use.

Sexual activity was reported significantly more frequently for women than for men, although this finding is consistent with a smaller number of women than men who are involved in the crack house milieu. The

most common sexual acts were vaginal sex, followed by oral sex (with almost all acts involving vaginal sex and half of the acts oral sex for men, and almost all involving vaginal sex and two-thirds oral sex for women: the anal sex rate was negligible). These data suggest that penile, and vaginal and oral sites for women are likely to need to be investigated for evidence of disease. Condom use was low, with half of both men and women reporting never using condoms despite having multiple partners. Only one-quarter of respondents reported always using condoms. With such a high rate of STD and viral hepatitis markers and relatively low consistent condom use, the population described here has all the characteristics of a core STD transmission (and reception) population.

While the inclusion characteristics of this population may have weighted it toward those more dependent on crack, there is clear evidence of high levels of dependency. There is a consistent pattern of approximately 80% of men and 75% of women who report using more crack than they intended to, spending a great deal of time getting crack or recovering from its effects, and needing larger amounts of crack to obtain the same effect (this latter percentage being the only dependency question where men had a significantly higher percentage than women). Similar proportions applied to reporting

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“The highest odds ratios are associated with injecting for hepatitis C and HIV infection; although for HIV, the odds ratios for STD infection is also high.”

emotional or physical problems from using crack, and withdrawal symptoms. It appears reasonable to conclude that over three-quarters of this sample is addicted to crack.

Treatment in the past was reported by just over half of the respondents, and although the type of treatment was not recorded, this is probably treatment for crack use. About 40% had also injected drugs, and of these, about half reported sharing injection equipment. These data suggest a significant degree of polydrug abuse, although it is of interest that reported age of first crack use was high in the late twenties. Previous heroin use was low, with only one in six reporting heroin use. These data also suggest that for those who inject, heroin is not the most common drug.

Conclusions

In conclusion, this study has demonstrated that crack-using urban populations are at high risk for STDs, and in particular ulcerative STDs such as syphilis and herpes simplex 2. The HIV infection rate in this sample reflects this co-infection. Of surprise, however, was the high rate of hepatitis B, and particularly hepatitis C. While there is evidence of a relatively high level of sharing injection equipment (one fifth of both men and women), these rates are still high. While the hepatitis B rates can be explained by

both unsafe injecting and unsafe sex, the hepatitis C rates may also have some other explanation, such as mucosal exposure via use of crack smoking equipment. The highest odds ratios, however, are associated with injecting for hepatitis C and HIV infection; although for HIV, the odds ratios for STD infection is also high and similar to that for injecting drug use, confirming the association between STDs and HIV infection. From a public health point of view, such high rates of hepatitis B and C may have implications for the increased risk of development of liver cancer in this population in the next few decades.

It is clear that ulcerative STDs are relatively common in this crack house population, along with high sexual partner numbers and low condom use. This is consistent with previous literature: DeHovitz et al. (1994) have previously noted that innovative methods must be sought to link street outreach, STD diagnosis and treatment, drug treatment, and emergency shelter programs. These data do demonstrate that it is important to consider STD treatment along with crack treatment, and that HIV prevention will need to target STD prevention and substance abuse concomitantly. In order to prevent HIV transmission in this population, we need to consider another dual diagnosis: STDs and crack use. While

mandating STD screening in treatment will have an impact, since only half of this population has had previous contact with treatment, other avenues such as outreach will need to be explored to concomitantly treat STDs and substance abuse. Such treatment of STDs may reduce transmission at two points: both from those infected with HIV as well as to those uninfected. It may also provide a further avenue for attracting crack users into substance abuse treatment.

Appendix 1: Total Study Population

Total Study Population

Factors	Number (N)	Frequency (%)
Gender		
Male	348	80.0%
Female	79	18.2%
Race		
African American	389	89.4%
Hispanic	2	0.5%
European American	28	6.4%
Asian/Pacific Islander	1	0.2%
Other	3	0.7%
Marital Status		
Married	125	28.7%
Unmarried	304	69.9%
Employed		
Yes	115	26.4%
No	315	72.4%
Children		
0	143	32.9%
1+	292	67.1%
STD		
Yes	209	48.0%
No	224	51.5%
IDU		
Yes	170	39.1%
No	262	60.2%
Needles Shared**		
Yes	88	51.8%
No	82	48.2%
Condom Use*		
25% or less	136	41.0%
50% or more	196	58.7%
Vaginal Sex (times)*		
0-1	164	49.1%
2-9	153	45.8%
10+	17	5.1%
Oral Sex (times)*		
0	177	53.0%
1+	157	47.0%
Anal Sex (times)*		
0	316	94.6%
1+	18	5.4%

**Among people who were IDU; *Among people who had sex in the past month.

Appendix 2: STD Infection Rates

Sexual Transmitted Disease (STD) Infection Rates, by Gender

	Total	Males	Females
Syphilis			
RPR	14.9%	12.0%	31.4%
MHA-TP	13.3%	na	na
HIV	11.3%	11.2%	12.7%
Hepatitis B			
Anti-HBc	53.3%	53.9%	48.0%
HBsAg	5.3%	5.8%	4.1%
Hepatitis C			
Anti-HCV	41.6%	39.9%	48.1%
Herpes Simplex-2	61.1%	57.8%	81.0%

Appendix 3: Significant Relationships and Odds Ratios for Infection

Significant Relationships and Odd Ratios for Sexual Transmitted Disease (STD) Infection

Syphilis	
Male	OR=0.3, p<.0001
HIV	
Had STD	OR=2.0, p<.04
IDU	OR=2.6, p<.003
Shared Needles	OR=3.8, p<.0001
Hepatitis Bc Antibody	
Age	Consistent decline with age, p<.002
Had STD	OR=0.6, p<.03
IDU	OR=0.3, p<.001
Hepatitis C Antibody	
Condom Use	OR=1.6, p<.02
Had STD	OR=1.9, p<.001
IDU	OR=16.9, p<.0001
Shared Needles	OR=15, p<.0001
Herpes Simplex-2	
Male	OR=0.3, p<.0001
Married	OR=1.5, p<.05
Condom Use	OR=0.7, p<.09

Appendix 4: Distribution of Condoms

Proportion of Occasions Condoms Were Used During Sex in the Past 4 Weeks

Number of Males and Females (<i>n</i>)	0 %	25 %	50 %	75 %	100 %
Males 329	49.2	2.1	17.3	4.3	27.1
Females 72	48.6	1.0	19.5	5.5	25.0

$t^2 = \text{ns}$

Appendix 5: Laboratory Tests Performed on Blood Samples

1) *Syphilis Testing:*

RPR: rapid plasma reagin, non-treponemal test for syphilis.

MHA-TP: microhemagglutination treponemal antibody confirmation test for syphilis, a marker for past infection.

The initial screen usually consists of an RPR test first, and a confirmation of RPR-positive specimens is performed with the MHA-TP test. Therefore, the prevalence of syphilis infection refers to the MHA-TP positive rate.

2) *HIV (human immunodeficiency virus) Testing:*

Anti-HIV: EIA (elisa immunoassay) method with Western Blot confirmation for the human immunodeficiency antibody, a marker for past infection.

The anti-HIV positive rate refers to the prevalence of HIV infection. Since HIV infection results in chronic infection (in a majority of cases), Anti-HIV is a marker for chronic carriers.

3) *HBV (hepatitis B virus) Testing:*

Anti-HBc: EIA method for hepatitis B virus core antibody, a marker for past infection.

HBsAg: EIA method for hepatitis B virus surface antigen, a marker for chronic carrier.

The anti-HBc positive rate refers to the prevalence for HBV infection, and the HBsAg positive rate refers to the prevalence of chronic HBV infection (or HBV carrier rate).

4) *HCV (hepatitis C virus) Testing:*

Anti-HCV: EIA method for hepatitis C virus antibody, a marker for past infection.

The anti-HCV positive rate refers to the prevalence of HCV infection. Because HCV infection results in chronic infection (in a majority of cases), anti-HCV can be interpreted as a marker for chronic carriers.

5) *HSV (herpes simplex virus) Testing:*

Anti-HSV-2: EIA method for herpes simplex virus type 2 core antibody, a marker for past infection.

The anti-HSV-2 positive rate refers to the prevalence of HSV infection.

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